

RECORDS OF ATHERINID FISHES AT INLAND LOCALITIES IN TEXAS AND NORTHERN MÉXICO

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On June 3-4, 1964, seining collections from the Río Conchos, Chihuahua, México. 1.1 miles east of Las Varas (near Ciudad Delicias), and at Ciudad Camargo, included specimens of the tidewater silverside, *Menidia beryllina* (Cope) (Arizona State University Nos. 881 and 894, respectively). The collection from Camargo also included one individual of *Chirostoma sphyraena* Boulenger (ASU 1533), and one specimen of an unidentified *Chirostoma* (ASU 1534). These records published by Tilton and White (1964), some provided by L. S. Campbell (*pers. comm.*), and localities given in Fisheries Reports of the Texas Parks and Wildlife Department, are the basis for this paper (Fig. 1).

Records for *M. beryllina* from Texas (Fig. 1) were obtained from Federal Aid to Fisheries Project Reports² as follows: between El Paso and the Big Bend National Park, in the Río Grande (presumably above the mouth of the Río Conchos); and listed as "an invader that dominates localities in Dove Creek and the South Concho River [Colorado River system, Texas]. Especially abundant in the reservoir created by the Guinn Dam [on Dove Creek]." Campbell (*pers. comm.*) provided two record localities for the Pecos River drainage—Imperial Reservoir, Pecos County, and Red Bluff Reservoir, Reeves and Loving counties. The following information was provided for other Texas areas: "We have also taken these silversides [*M. beryllina*] from Lake Brownwood, Colorado River drainage, Brown County [reported on by Tilton and White, 1964], and from the Concho River, Colorado River watershed, Tom Green County. I cannot account positively for the spread of these fish, but I suspect that they were introduced through the actions of bait dealers. Tidewater and Mississippi silversides [*M. audens* Hay] are also reported from some areas of the Red River system. We did not find silversides in our earlier work (1957-1958), but apparently once introduced they experienced an enormous expansion. Since 1963 the populations have been drastically reduced through unknown factors." Additional records in the Colorado River (Tilton, 1961; Tilton and White,

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2. I thank Mr. L. S. Campbell of the Texas Parks and Wildlife Department for providing information used in this report. Collections in México were made while en route to collect elsewhere for NSF Project GB-2461, the support of which is gratefully acknowledged. Permits to collect fishes in México were cordially granted by the Dirección General de Pesca e Industrias Conexas, México D. F., México. Able assistance in collecting was provided by Arthur C. Echtenacht, Richard K. Koehn, and Alan P. Wick.

3. *Menidia beryllina* is listed in the following Job Completion Reports from the Texas Parks and Wildlife Department that are available to me: Job B-32, "Fisheries Reconnaissance," Fed. Aid Proj. F-5-R-9 (1962), F-5-R-10 (1963), and F-5-R-11 (1964); Job B-33, "A Pre-impoundment Survey of Twin Butts Reservoir and its Included Watershed," F-5-R-10 (1963); and Job B-34, "An Investigation of Waters of the El Paso Area in Order to Evolve Efficient Management of the Game Fish Resource," F-5-R-11 (1964).

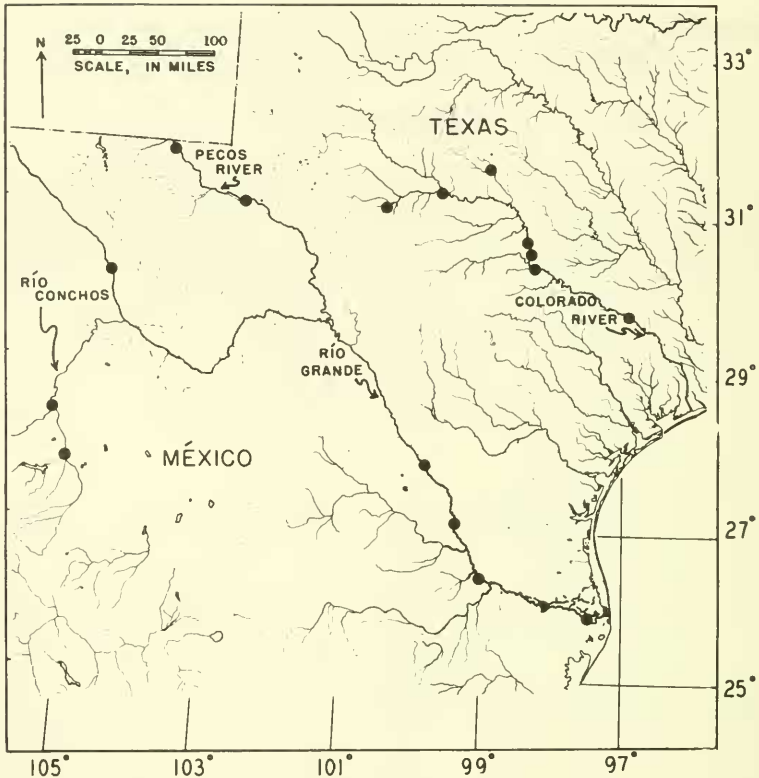


Fig. 1. Distributional records for *Menidia beryllina* in streams of Texas and northern México. The numerous records of Robinson (1959), from the lower Río Grande, are spanned by the five localities plotted; others are from Tilton (1961). Tilton and White (1964), and from data in the present paper. The most southern record station in México is Ciudad Camargo; *Chirostoma* spp. also were obtained at that locality.

1964) are from near La Grange, Texas, and from Lakes Inks, Buchanan, and Marble Falls.

Prior to 1951, *M. beryllina* had been recorded in the Río Grande system from the mouth at Brownsville, to 35 miles upstream from Laredo, Texas (Robinson, 1959; Tilton and White, 1964). Hubbs (1957), however, suggested earlier that the fish might inhabit most of the Tamaulipan Biotic Province of Texas (Blair, 1950), and this would extend its possible range to near the mouth of the Devil's River, Val Verde County. It is conceivable that it invaded upstream in both the Colorado and Río Grande, perhaps in response to decreasing discharges and increasing salinities that result from irrigational use, but the distances involved and inhospitable habitats that exist make this less probable than is direct introduction by man.

Experimental introductions of marine fishes into Imperial and Red Bluff reservoirs of the Pecos River system, the same impound-

ments from which *M. beryllina* has been caught, raises the possibility of accidental introduction of *Menidia* in those areas as eggs or larvae in water used for transport of the larger species.⁴ Because atherinids are difficult to transport as adults it seems unlikely that *Menidia* was transferred a long distance as such. The promiscuous spawning of species of *Menidia* (Bumpus, 1898; Bigelow and Schroeder, 1953) would make eggs available for accidental collection, and *M. beryllina* occurs abundantly in Texas coastal waters from which many of the marine fishes were obtained for stocking (Gunter, 1945). Movement down the Pecos River, then through the Río Grande and into the Río Conchos, may explain the origin of the Mexican stocks. With styrofoam coolers and other types of bait containers now available, short-distance transfers to the Colorado River basin, for example, might have occurred as suggested by Tilton and White (1964) and by Campbell (see above).

Stream occurrences of *M. beryllina* are few and it seems worthwhile to give the following habitat notes. At Las Varas the Río Conchos was 50 to 75 feet wide and four feet deep at the deepest point. Pools alternated with riffles and bottoms were gravel except in quiet backwaters where silt occurred. Aquatic macrophytes were absent, but the shore was lined with a thick gallery of trees and shrubs. The water had a milky color and was salty to taste; discharge was estimated at about 125 cubic feet per second. At Ciudad Camargo there was a large pool upstream from the highway bridge and small pools and riffles near the bridge. Again the water was Milky in color and was malodorous, appearing polluted with sewage. Vegetation on the banks was cattail (*Typha*), low grasses, and small shrubs. Various aquatic plants were on riffles (*Chara*, *Najas*, and *Potamogeton*), but pools were unvegetated. Bottoms were of deep silt except on the swiftest riffles. Discharge was about 80 cubic feet per second. At both localities the atherinids were concentrated below riffles in moderate current, or were in eddies. They were obviously in mid-water and appeared to avoid the banks. Five specimens of *M. beryllina* were obtained at Camargo and 134 at Las Varas. In the latter collection, specimens are from near 35 to more than 60 mm. in standard length.

Of the two additional atherinids obtained at Camargo, *Chirostoma sphyraena* is endemic to the Río Lerma basin of south-central México, in the Pacific watershed (Meek, 1904). It could occur in the relatively well-collected Río Conchos only through introduction. The unidentified specimen of *Chirostoma* may also have come from the Lerma basin, from which a number of species of that genus are described.

Movement of fishes by man from place to place in México is undoubtedly increasing with construction of reservoirs and develop-

4. For data on these introductions refer to Job Completion Reports F-1, "Experimental Stocking of Marine Fish Species in Saline Waters of Western Texas," Fed. Aid Proj. F-5-R-9 (1962), F-7-R-9 (1962), F-7-R-10 (1963), and F-5-R-11 (1964), and other reports listed therein. Species of marine fishes that are reported as introduced are as follows: *Roccus saxatilis* (Walbaum), *Cynoscion nebulosus* (Cuvier), *Leiostomus xanthurus* Lacépède, *Micropogon undulatus* (Linnaeus), *Sciaenops ocellata* (Linnaeus), *Pogonias cromis* (Linnaeus), and *Paralichthys lethostigma* Jordan and Gilbert.

ment of sport fisheries. Solórzano (1963) discussed the biology of *Chirostoma estor* Jordan in reference to its possible artificial propagation and introduction into areas other than its native range as a food fish; perhaps attempts have already been made to introduce some species of *Chirostoma*. Eggs of some species of the genus, at least of those from lake Pátzcuaro, float (Solórzano, 1961, 1963), and easily could be pumped into holding tanks meant for other fishes and inadvertently transferred outside of their native ranges.

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